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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/820,302	04/08/2004	Hilde Grude Borgos	60.1531	7440

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EXAMINER	
HUGHES, SCOTT A	

ART UNIT	PAPER NUMBER
3663	

DATE MAILED: 10/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/820,302	BORGOS ET AL.	
	Examiner	Art Unit	
	Scott A. Hughes	3663	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 July 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-21* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-21* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 April 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 7/24/2006 has been entered.

Response to Arguments

Applicant's arguments with respect to claims 1-21 have been considered but are moot in view of the new ground(s) of rejection.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-7, 13-15, and 18-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sonneland in view of Borgos (EAGE 2002).

With regards to claims 1, 20, and 21, Sonneland discloses a method of processing and interpreting seismic data. Sonneland discloses a computer system and

a computer product that have means for carrying out the method. Sonneland discloses identifying a plurality of extrema positions associated with the seismic data, deriving coefficients that characterize the seismic data waveform, from a single data point, in the vicinity of the extrema positions, and forming groups of the extrema positions where the coefficients that characterize the waveforms are similar (Figs. 4-5) (Column 5, Line 46 to Column 6, Line 8; Column 1; Columns 3-4). Sonneland shows groups of extrema positions where the coefficients are similar in Fig. 4. The claim language is broad enough that any grouping of extrema positions where the coefficients have any type of similarity reads on the claim. Sonneland discloses using an observed seismic signal to derive the coefficients. Because this signal includes points in the vicinity of extrema positions, it reads on the claim limitation of deriving coefficients that characterize the seismic data waveform, from a single data point, in the vicinity of said extrema positions. An observed signal includes a plurality of single data points, which make up the signal. The claim language is broad enough that as long as a single data point is included in the derivation, the prior art reads on the claim. The claim limitation "from a single data point" does not exclude the use of other data points or a plurality of data points as long as a single point is included in the data. The limitation only requires that a single data point be used. Sonneland does not disclose that the grouping is done using a Gaussian statistical model. Borgos teaches using a Gaussian statistical model when using grouping algorithms on attributes of seismic data in order to map production effects in a reservoir region (Pages 1-3). Borgos teaches that a Gaussian statistical model can be used to group attributes of seismic data so that classes of the seismic

data that can reveal formation regions (Pages 1-2). It would have been obvious to modify Sonneland to include using a Gaussian statistical model to group the extrema positions as taught by Borgos in order to be able to identify different formation regions based on the position and spread of the attributes in the Gaussian model.

With regard to claim 2, Sonneland discloses that he extrema positions are identified with sub-sample precision (Column 4, Lines 20-33).

With regard to claim 3, Sonneland discloses that the coefficients are derivatives (Column 1, Lines 25-57).

With regard to claim 4, Sonneland discloses that the derivatives are determined using orthogonal polynomials and the derivatives allow local reconstructions of seismic traces in the vicinity of the extrema positions to be obtained using Taylor series expansions (Columns 1, 3-4).

With regard to claim 5, Sonneland discloses that the seismic data is subjected to orthogonal polynomial spectral decomposition and the extrema positions are identified based on the decomposed seismic data (Columns 1, 3).

With regard to claim 6, Sonneland discloses that the orthogonal polynomial spectral decomposition comprises volume reflection spectral decomposition with Chebyshev polynomials used as the basis functions (Columns 1, 3).

With regard to claim 7, Borgos teaches that the processing attribute data from seismic waveforms including forming groups of extrema positions utilizing a statistical model further assumes that coefficient attribute vectors have a Gaussian distribution with separate parameters for each group (Pages 1-2).

With regard to claim 13, Sonneland discloses defining a volume of interest within the seismic data (abstract; Columns 1, 4).

With regard to claim 14, Sonneland discloses that the volume of interest comprises a vertical window of constant thickness or a volume between two pre-determined seismic horizons (Column 4, Line 27 to Column 6, Line 34).

With regard to claim 15, Sonneland discloses that horizon segments are extracted on opposite sides of input fault surfaces (Column 5, line 48 to Column 6).

With regard to claim 18, Sonneland discloses that the groups of extrema positions are used to create a horizon interpretation (Column 5, Line 45 to Column 6, Line 40).

With regard to claim 19, Sonneland discloses that the groups of extrema positions are used to extract a seismic volume containing multiple reflectors having similar seismic response (Column 5, Line 45 to Column 6, Line 40).

Claims 8-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sonneland in view of Borgos as applied to claims 1-6, 13-15, and 18-21 above and further in view of Hildenbrand.

With regard to claims 8-11, Sonneland does not disclose that the groups of extrema positions are formed using supervised classification. Sonneland discloses that the coefficients of the extrema values can be used in determining fault locations and other geological features (Column 5, Lines 48-68). Sonneland discloses that sorting rules are given to a computer to identity and isolate the features, and that synthetic

traces can be used to help classify the data (Columns 5-6). Sonneland does not disclose using supervised or unsupervised classification for the positions of the extrema points. Hildenbrand discloses that it is known to use supervised and unsupervised classification in determining horizons and faults (Columns 1-3) using extrema values. It would have been obvious to modify Sonneland to include using either supervised or unsupervised classification with the seed points and number of classes provided by a user as taught by Hildenbrand in order to generate a horizon map of a survey area.

With regard to claim 12, Sonneland Hildenbrand discloses that seed points for the unsupervised classification are selected at random and small spatially contiguous horizon segments are extracted locally around the seed points (Columns 3-6).

Claims 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sonneland in view of Borgos as applied to claims 1-7, 13-15, and 18-21 above and further in view of Stark.

With regard to claims 16 and 17, Sonneland does not disclose that fault displacement estimates are determined using the extracted horizon estimates or that the fault displacement is broken into throw and heave components. Stark discloses that selected positions can be used in horizon estimates to calculate the throw and heave of a volume (pages 8-11). Sonneland discloses estimating volumes from the selected extrema points, and discloses that these estimates can be used for detecting reflectors, fractures, and other geological features in a survey (Columns 5-6). It would have been obvious to modify Sonneland to include calculating the throw and heave of the detected

fault locations from the estimated horizons in order to be able to study the movement of hydrocarbons in a formation through fault movement.

Conclusion

The cited prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Scott A. Hughes whose telephone number is 571-272-6983. The examiner can normally be reached on M-F 9:00am to 5:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jack Keith can be reached on (571) 272-6878. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SAH

JACK KEITH
SUPERVISORY PATENT EXAMINER